(41) abstracted

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INFORMATION REPORT

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PREPARED AND DISSEMINATED BY

CENTRAL INTELLIGENCE AGENCY

COUNTRY

Hungary

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SUBJECT

Radar Development (material shortages, adaptation of Russian designs, description of fire control mechanisms, personnel, radar observation networks)

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SUPPLEMENT TO REPORT #

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1. The electronics industry of Hungary was world famous before 1940, but many of its factories were destroyed during the war. After the war, there was little improvement as everything went into war reparation deliveries to the USSR, who brought us US prototypes and demanded that we develop them. This caused difficulties in many places because producing as we were on our own and German standards, for the radio industry, we now had to produce on Soviet military standards. However, these are practically the same as the specifications of the US military. This was and is very difficult, and in many cases we could not achieve the desired quality.

2. A small number of triodes (Hungarian radar) were produced during the Second World War in the Standard factory. Here Hungarian engineers employed PPI for the first time, unknown to the Germans.

3. The Hungarian War Ministry (War Technical Institute) took the first large step toward developing magnetron type-10 centimeter radar. This prototype became a production reality in 1951. The design was copied from SCR-584 US radar and "MIT-Radiation Laboratory Series", applied to our domestic conditions. Naturally it had many faults. However, the government was more interested in production than the correction of these faults. About six or seven instruments were made but they were of no value. They were used for training purposes, but today they are not even used for this because the damaged parts cannot be replaced. Because there was no interest in development, it was impossible to produce a good Hungarian-made radar instrument.

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4. After this, the so-called military experts bought the Soviet-made Ladoga locator in "Breadboard" form. Two or three advisers arrived with this instrument but they had no power to make changes. We had to make everything, even the smallest screws, from Soviet plans. Many steel, ceramic, and insulator finishing methods were not standard in Hungary. Despite this fact we had to work on GOCT and OCT patterns, and the participating plants were forced to accept them by a decree from the Ministry.

5. The "ME" division of the Egyesult Izzo (United Lamp) factory solved the problem of producing special radar tubes, after huge expenditure, but a later decree directed that this plant was to be used only for the production of Cathode Ray tubes and indicator tubes. It made these tubes for all the satellites. The other tubes were made by the USSR. The construction requirements had to be strictly followed so that interchangeability would be possible with Soviet material. After 1953 it was not planned to export

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Central Reference, CIA

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Hungarian radar instruments. In 1952 a Czechoslovakian delegation visited the plant, but did not order anything. Today the USSR and every Satellite country makes its own radar instruments.

6. For the last three years USSR radar has been made in Sverdlovsk and not in Moscow, which was formerly the case. In 1955 and 1956 the Sverdlovsk plant was visited by a Hungarian delegation who told us that selected engineering and laboring personnel were being trained there to work in China in a factory already under construction. Many materials which cannot be produced in Hungary, and even some which can, came from the Soviet Union. (Bronze, ceramics, bakelite mica condensers, metal powders, polyethylene, trolitul, [illegible] tubes).

7. The Finommechanikai plant was often visited by Soviet civilian and military delegations and advisors were stationed there almost permanently. The raw materials for the radar instruments were delivered by about 80 sub-contractors. The assembling of the components is done only by Finommechanikai Vallalat, 10 Feher St, Budapest 10. The construction of the factory was completed in 1952, but the erection of other buildings is still in progress. (Before 1952 the "6055" plant, built near the Gamma Optikai Mavek, 151 Fehervari St, Budapest 11, produced Hungarian-built radar).

8. The Soviet blueprints go to the Telecommunication Research Institute, 54 Gabor Aron St, Budapest IX (Rossadomb), where they are redrafted with Hungarian inscriptions and turned over to the manufacturing plant. Supervision over the production and materials delivered by other factories is done by agents of the Ordnance Division of the War Ministry. The tests are made by the War Technical Institute's experimental station in Bugyipuszta (located in the vicinity of Bugyi village at the same altitude and eastward of Ercsi not far from the Danube River by Soroksar.) It was only here that there was any original thinking. They constructed the 10-centimeter (three cm with a magnetron) artillery radar transmitter measuring 12" X 20" X 30" with the same performance [redacted] 25X1
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9. After the previously mentioned Hungarian-built but not used radar, we first produced the above mentioned Soviet Ladoga short range locators. Its Hungarian code name is "Duna" (see Draft #101). It is a hard tube-pulse triode transmitter. The concentric cables have polyethylene insulation about three-quarters of an inch in diameter. (For inner adjustment see Draft #102). It has indicators, "A" scope, "PPI", and a range of 30, 150 and possibly 225 kilometers. Minimum is about two kilometers. They cannot erase the central traces. The dipol array can be shifted from the inside so that the transmission characteristics will be changed. So far, they have not been able to measure the degree of change. It has no azimuth indicator, no optical method to enlarge the radar picture, and no way to keep out temporary traces. Photography of the screen is not done. Wave length is about 1.5 meters. The antenna could be turned only in the horizontal plane. In case of PPI speed equals six scans per second. Impulse is modulated (hard tube-pulse) with artificial line. Receivers' sensitivity is about two microvolts. There is also a telephone to the artillery radar. Line voltage equals 115 volts and 127 volts. Power supply comes from two generators built in the trailer.

10. Antenna feed is by concentric cables for transmitter receiver switching tube (see Draft #103). The antenna does not automatically track the moving object (target). The test instrument is built around a volt ampere ohmeter. Intermediate frequency is produced by a triode mixer of 30 MC. The first instrument was completed in 1953. Production of instruments

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was discontinued in 1955. They made about 36 pieces. They are not producing any more of them because Hungary has no need for additional short range locators. Therefore they will not be changed as they do not want to develop them further. Effective range: able to follow an airplane flying at 1500 to two thousand meters altitude, for 120 to 140 kilometers. We detected airplanes in the summer of 1956 near Budapest at an altitude of 16-18 thousand meters on several occasions. Considering the fact that the best Soviet airplanes could not go higher than 13 thousand meters, these planes must have belonged to the US Air Force. (We did not report our observations to the officials and no one else had noticed, so the public does not know about this).

11. The effective range of the similar Soviet type radar which we used as a sample was given by the Soviet advisor as 80 kilometers. This instrument proved successful during troop tests. Its faults: has poorly trained repairing and operating personnel, and always had trouble with the truck motor and the magnetic ignition. The second type produced was almost exactly similar to the US SCR-584 in dimensions and circuitry (10 cms). Differences: its weight is five tons heavier because of Soviet alterations; the generator is somewhat larger (because of the use of low quality gasoline the motor dimensions must be greater to achieve the required performance); the swing of the antenna is greater than the US SCR-584. The servo mechanism is inaccurate, but even if it were accurate it is an obsolete type.

12. They want to counterbalance its inaccuracy by manufacturing antiaircraft shells with proximity fuses. This attempt, however, has been unsuccessful after trying for one and one-half years. Many of the men who are experimenting in this field are now in the West.

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13. They had produced nine artillery radar instruments by 9 Nov 56. They turned these over to be tested. They cannot measure many things with them; for example radiation characteristics. The general opinion about these instruments is that they are not nearly as good as the US SCR-584 and their combat usefulness will be short. This instrument's code name is "Drava".

14. Radar measuring devices have been on the market since 1956 through the Electroimpex Company, Nador St, Budapest IV. The following instruments were shown at the Leipzig Fair:

(a) Precision cavity resonator-slotted line
(1800 to four thousand MC per second)

(b) Wide range cavity resonator
(1800 to four thousand MC per second)

15. Fire control systems which can be connected to radar instruments are made by the Gamma Optical Works, 140 Fehervari St, Budapest. So far, however, only prototypes have been produced. Production of the newest 10-centimeter artillery radar instruments, which supposedly have greater accuracy, is now in progress. Its code name is "Szava". The parabolic reflector can not be lowered into the inside of the truck during transportation. The truck itself is not much larger than the power supply trailer. A Soviet instrument of this type was on the grounds of the Finommechanikai Vallalat in the summer of 1956 but we could not see inside as it was sealed while translation of the blueprints was in progress. Those who were able to read all the material say it will be somewhat more accurate than "Drava". The synchro system is 500 cycles per second. It should be less costly because six and one-half million forints was admitted to be the cost of one "Drava" instrument.

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16. The whole communications industry, and especially the radar industry, was hindered by lack of raw and basic materials. Nobody wanted to produce small quantities of special articles (lenses of pilot lamps for radar instruments for example) because in big plants it is uneconomical. Nevertheless they are producing them, because the quality obtainable in commerce in poor and socialist big business gives an order to the small tradesman only as a last resort (the leaders not daring to do it as contrary to socialist doctrine or efficiency) [sic]

17. Enforced Soviet production and organizational methods are weakening the producing capacity of the already politically demoralized technical and laboring classes. Many times supervisory officers (who were not searched) stole many difficult to replace parts from the plants although they could not be used for civilian purposes. Many parts cannot be produced without imported materials from the West (for example plexiglass "Duroflex" insulated wire for amplidynes, etc). The machinery of the plants comes mainly from East Germany, but also from Hungary and Czechoslovakia.

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18. All Hungarian industry, especially communication engineering, is in a state of confusion.

19. Other information which does not concern radar manufacturing:

(a) An artillery Colonel from the Engineering Corps developed a machine gun. It had greater than usual firing power, a smaller size, and a lighter weight (4. 5 kilograms).

(b) Since 1952 an attempt has been made in the Telecommunication Research Institute and in the Standard (now Beloiannis) Communication Technical Plant, 120 Fehervari St, Budapest 11 to build a 24-channel microwave telecommunication system which could be used for military purposes. So far they have not been successful, though they have a US sample (1943 type).

(c) The demand of the Secret Police for communication technical instruments was met by the Mechanical Laboratory, 25 Gorkij Avenue, Budapest 7. Magnetophones were made here for wire tapping purposes. Magnetic tape recorders, which could be carried in pockets, and highly sensitive microphones were also made here. These were capable of picking up whispering as well as talking.

(d) Fire control radar is placed in the newest Soviet interceptor planes above the air intake. It is made for night interceptors. It works on three cm wave length. Maximum service altitude is 13 thousand meters. It has two very precise altitude meters and an IFF system. Hungary is not producing airborne radar. It is known that US airborne radar has a power of several megawatts to destroy the crystals of ground based radar. If this happens, training directions order an immediate crystal change. We also heard that US planes

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are covered with material able to absorb radar waves. We had two Soviet radar sets for repair at the Finom-mechanikai Vallalat [the antenna of one of them and a picture of the other can be seen on Draft #105 and #106]. [redacted] 25X1

(e) The radar observation network of Hungary is two-fold. One is controlled by the Soviet Army and Secret Police and the other by the Hungarian Army. Almost all long range radar instruments are Soviet made. The "Duna" code-named radar is used in small numbers, but ordinarily only along the borders between Hungary and the other Satellites. For the training of military planes a definite air space is selected. Civilian planes, even in inland travel, must report their starting time, direction, purpose, and line of flight. They have to ask permission in advance if they wish to change their course because of bad weather conditions. Only after permission and only under exceptional circumstances, can they fly above a definite altitude (one thousand to 1500 meters). To enter into or fly above clouds additional permission is necessary. Incoming and out-going civilian planes must fly into designated gates but not until permission is granted. Gliders, in case of long flights, must fly over definite points, usually large cities. Observation stations report their arrival and notify the next station in advance. [redacted] one 25X1 glider that was lost above Carpatho-Ukrainian territory. After repeated requests the Soviets returned this lost pilot in chains. Two Soviet jet interceptors forced him to land. The same thing happens in Hungary when planes fly without permission or do not follow the above described directions. Antiaircraft artillery is placed on all airfields. Their main duty is not the defense of the airfield but to shoot down planes flying without permission. There were many cases of officers in charge forgetting to report the take off of a plane to the artillery (Soviet system). In Hungary the pilots must be married and must have normal relations with his wife.

(f) There were radar developments for commercial purposes also. The prototype of an English made navigational radar was tried out on the Danube in the first half of 1956. It is owned by the Hungarian Technical University, War Engineering Faculty, Communication Technical Division. After some modifications, it could be a very useful instrument. Its production has not yet been begun.

(g) A communist who visited Moscow and Sverdlovsk remarked to me that the Soviet has a giant industry but that it is a shame that they are copying everything.

20. The following are the research laboratories and factories of the Hungarian Electronics Industry:

(a) Kozponti Fizikai Kutato Intezet (KFKI) A Magyar Tudomanyos Akademianak - Central Physical Research Institute of Hungary Scientific Academy. Atomic-Physical laboratories; reactor, isotope research. Many scientific works for Hungarian military. One of these is a pocket-size transportable Geiger Muller counter for military units (1952). Located in Csilleberc near Budapest in the mountains of Buda.

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(b) Beloiannis Hiradastechnikai Gyar - Beloiannis Technical Communication Factory. Formerly the Standard Radio Factory. Makes telephone centrals and equipment for civilian and military uses; multichannel microwave, telephones and military radios.

(c) Telefon Gyar - Telephone Factory, Budapest 14. Makes military telephones and radios.

(d) Orion Radio Gyar - Orion Radio Factory, 60 Jaszberenyi St, Budapest 10. Military and civilian radios.

(e) Adocso Gyar - Factory of Transmitter Tubes. Formerly the Phillips Factory. Transmitter tubes and military radios.

(f) Mechanikai Meromuszerek Gyara - Mechanical Measuring Instruments Factory; and (g) Kozlekedesi Meromuszer Gyara - Transportation Measurement Instrument Factory. These two companies are located at Bulcsu-Utca, Budapest 13. Both manufacture automobile and airplane instruments. The General Manager is Janos Farkas.

(h) Tavkozlesi Kutato Intezet - Telecommunication Research Institute. First Section.

General Manager: Istvan Biro. Military officer.
Multi-channel Microwave Department: Gedeon Willoner
Aerials Department: Laszlo Uzsoki. (now in the West)
Indicators Department: Dr Istvan Bartha, Prof of Radio Receiving at Technical University, Budapest. Jozsef Gausz.
Magnetic Materials: Edwin Istvanffy.
El Materials: Ervin Ratkay
Timing -Circuit Dept: Dr Nandor Szabo
Measuring-Technic Dept: Gyorgy Almassi
Chemical Dept: Dr Peter Denes, Winner of Kossuth Prize. (now in the West).

Telecommunication Research Institute. Second section. (Formerly the Tungsram Co) Budapest-Ujpest.

Tubes Dept: Dr Istvan Palocz [redacted] 25X1

(i) Finommechanikai Vallalat - Finemechanical Company

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Chief Engineer: Ede Arato (now in the West)
Quality Control: Frigyes Kara (now in the West)
Industry Laboratory: Janos Kaposi [redacted]
[redacted] 25X1
Industry Laboratory: Bela Szabo (in Poughkeepsie, New York)
Progress Dept: Laszlo Bajaky (in the West)
Military-Technical Dept: Frank Niertit [redacted] 25X1

(j) Szikra Electromos Gyar, or Voros Szikra Gyar - Szikra Electrical Factory, Budapest II. Makes equipment for Hungarian Air Force.

(k) Hirado Technikai Vallalat - Communication Technical Company. Repairs for the Military, Aerodromes and Electronic installations.

[redacted] 25X1

(l) Gamma Optikai Muvek - Gamma Optical Works, Fehervari St, Budapest 11. Optical Products for military; theodolites (not electron theodolites).

(m) MOM - Magyar Optikai Muvek - Hungarian Optical Works. Optical products for the military; theodolites (optical) for longer distances. Timing mechanisms for artillery.

(n) Elektronikus Merokeszulekek Gyara - Factory of Electronic Measuring Instruments, Budapest 16. Electronic measurement instruments for civilian use.

(o) Elektromos Meromuszerek Gyara - Factory of Electrical Measuring Instruments, 64 Voroshadsereg St, Budapest 19. All types of electrical measuring instruments for civilian and military use.

[redacted] six drawings 25X1
of various radar equipment as follows:

Draft #101 - Soviet Ladoga short range locator - Hungarian code name is "Duna".
Draft #102 - Inner adjustment of Soviet Ladoga
Draft #103 - Transmitter receiver switching tube
Draft #104 - Power Supply for "Drava" & "Szava"
Draft #105 - Antenna of Soviet radar set
Draft #106 - Picture of Soviet radar set

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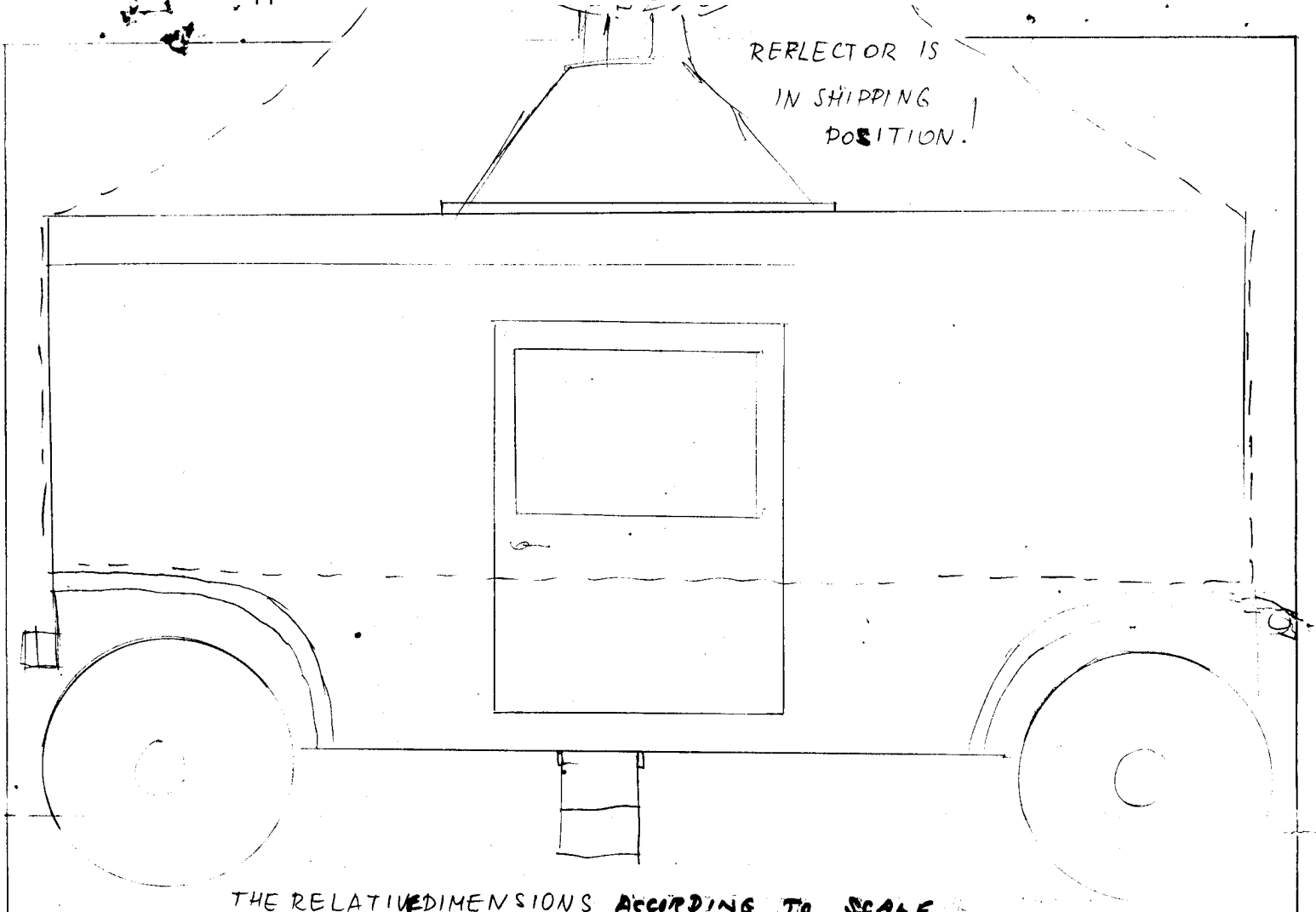
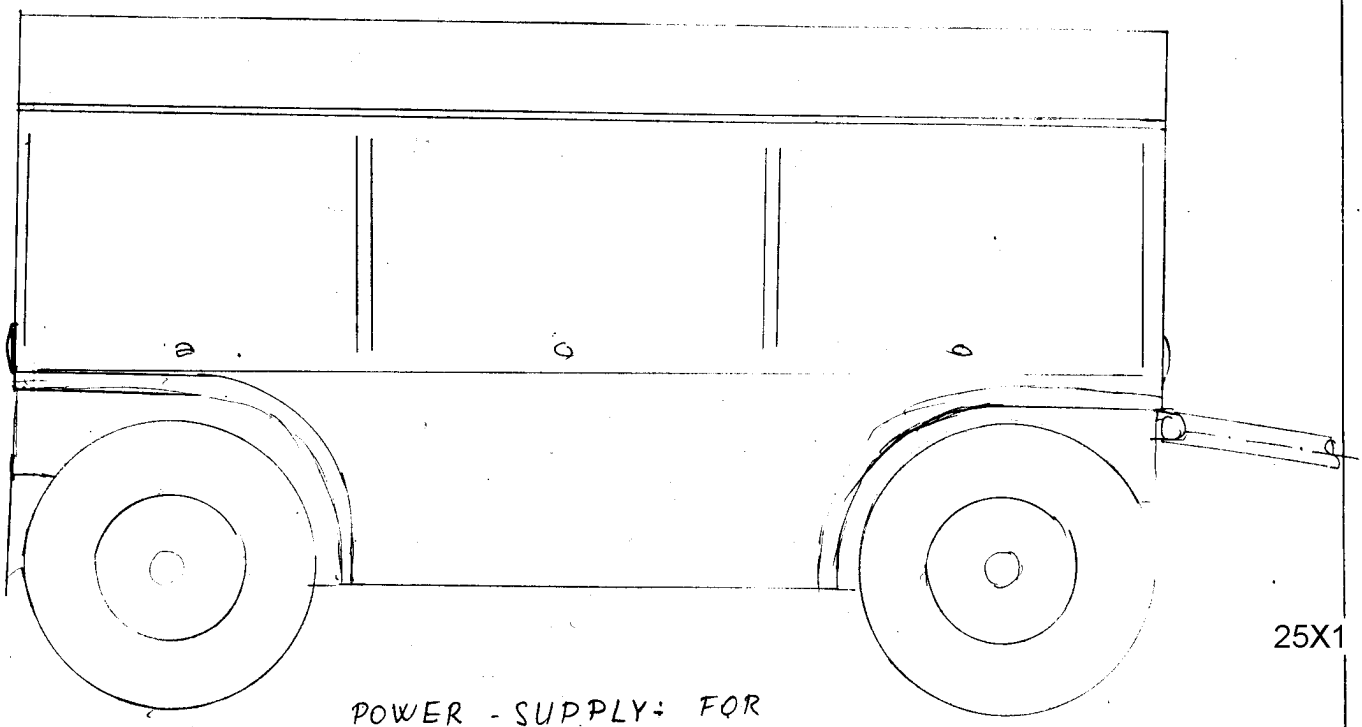


THE RELATIVE DIMENSIONS ACCORDING TO SCALE



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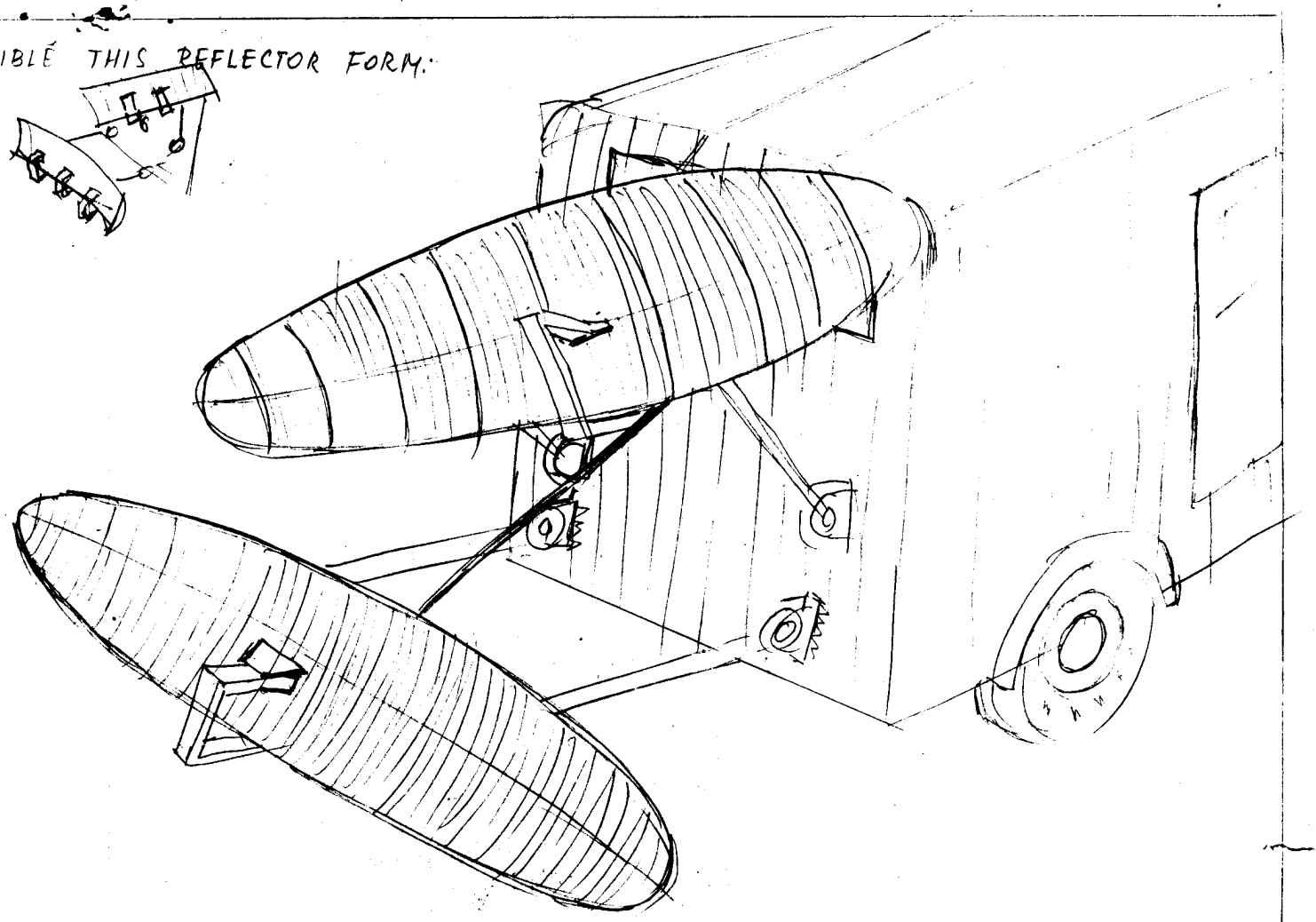
POWER - SUPPLY: FOR
10 cm RADARS: „DRÁVA" & „SZÁVA."
EQUAL WITH : [redacted] (LITTLE DIFFERENT IN THE MOTOR.)

POSSIBLE THIS REFLECTOR FORM.



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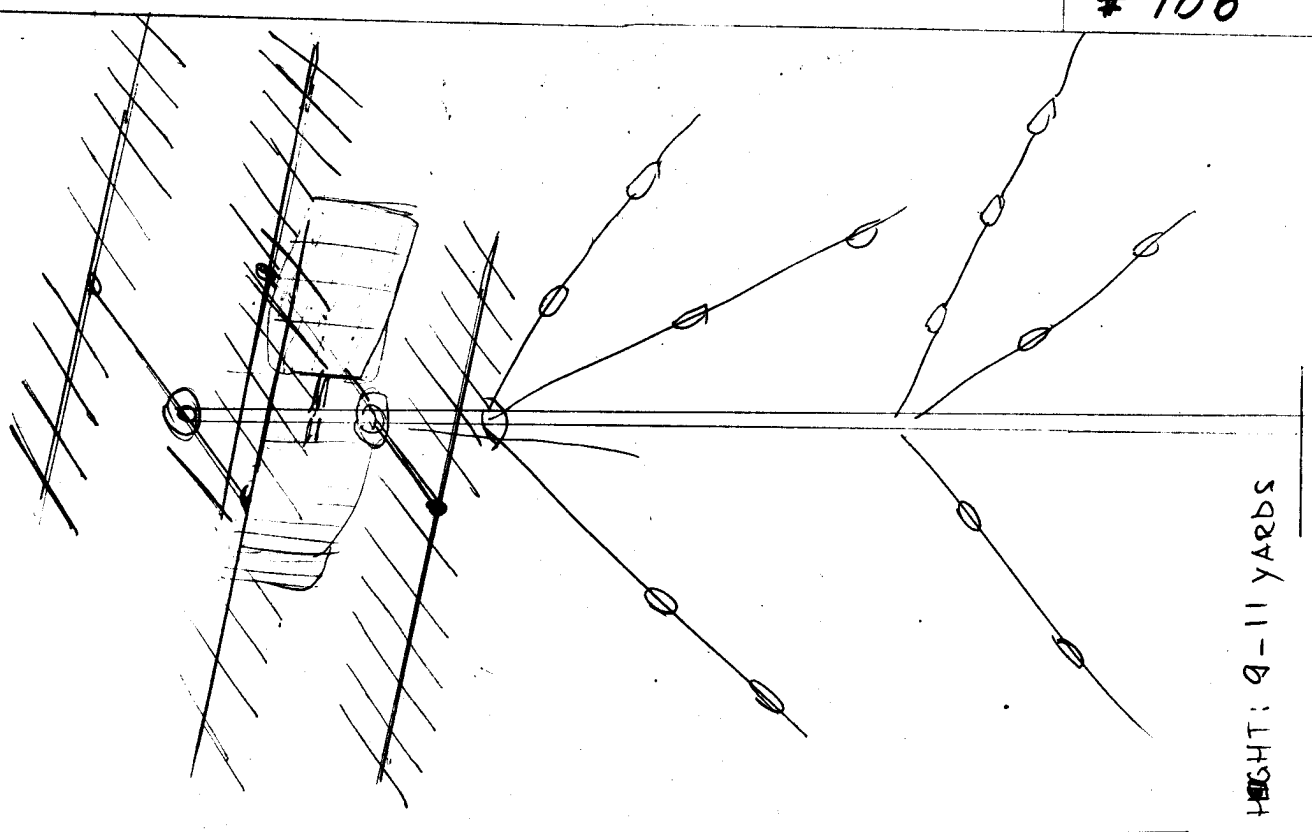

105

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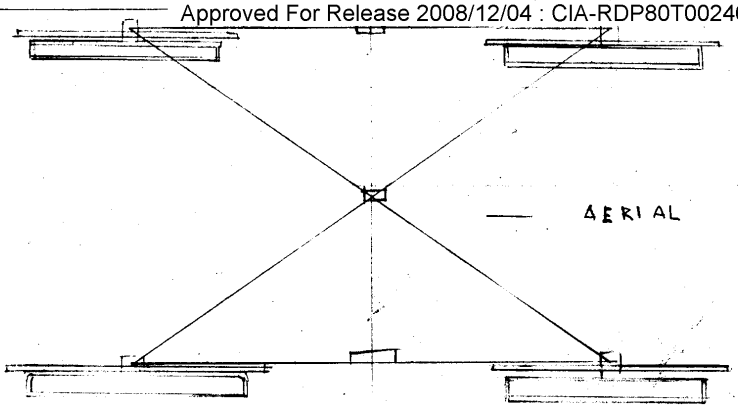
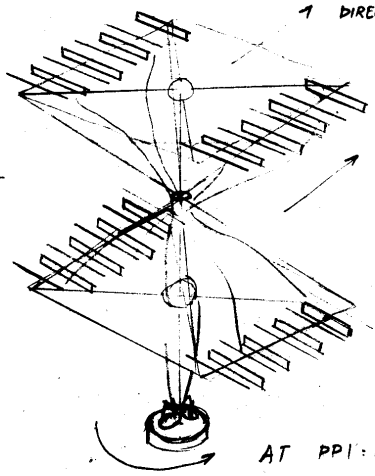
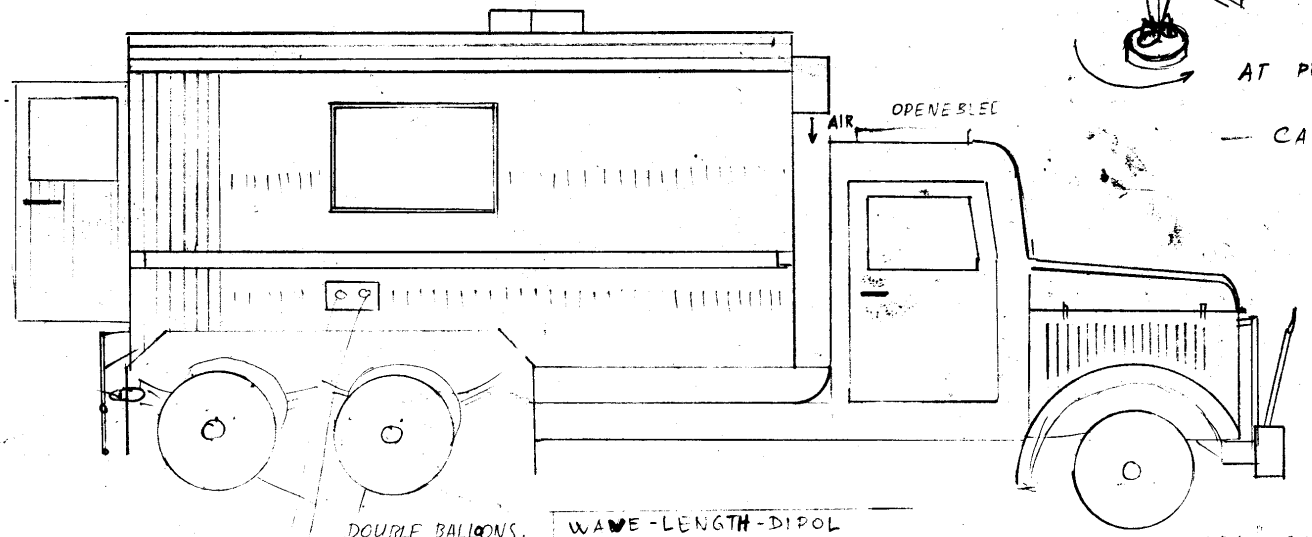
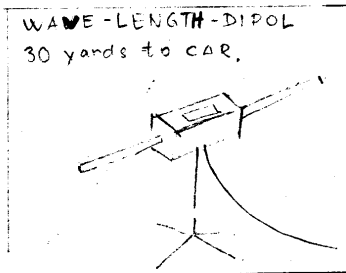


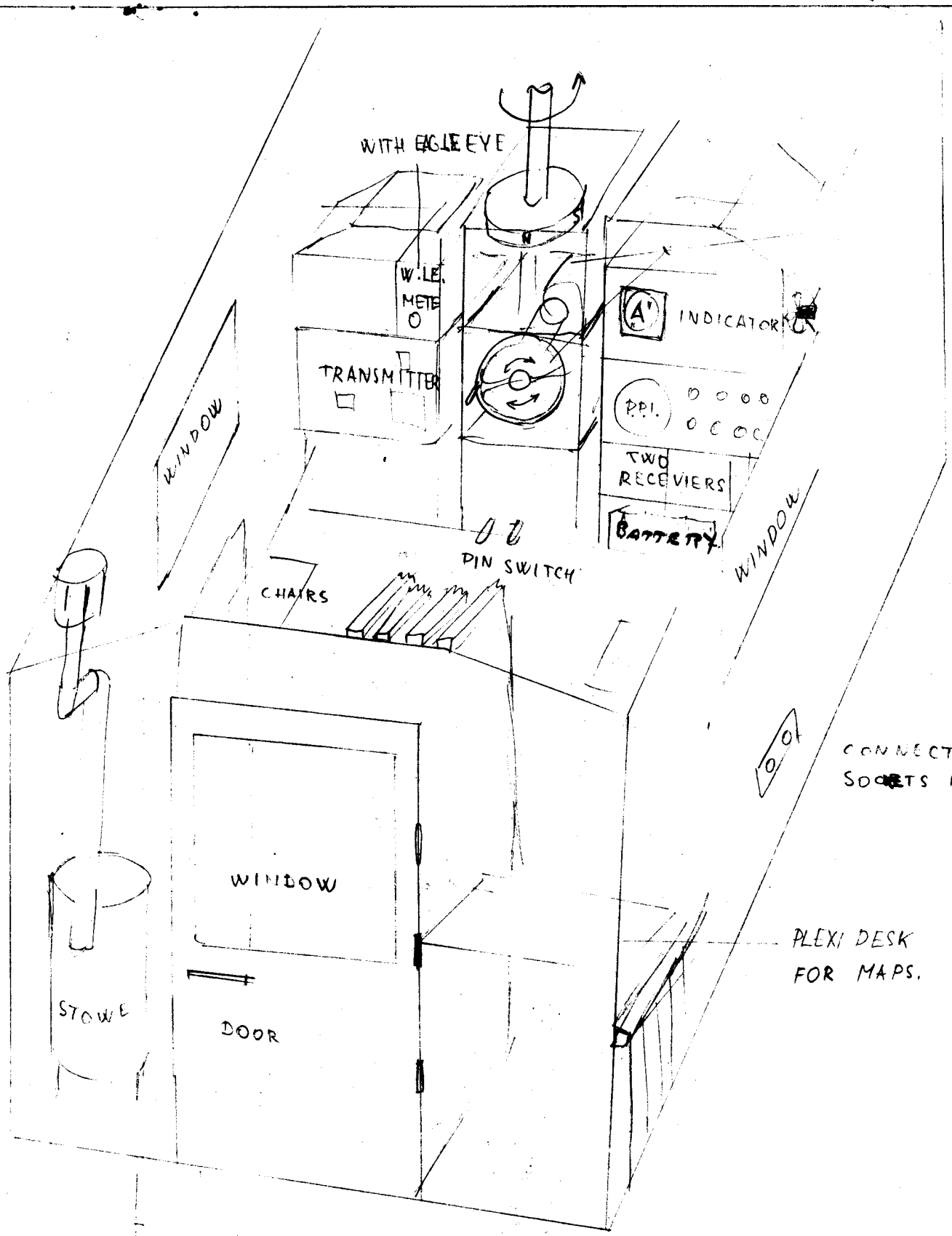






TO POWER SUPPLY

101



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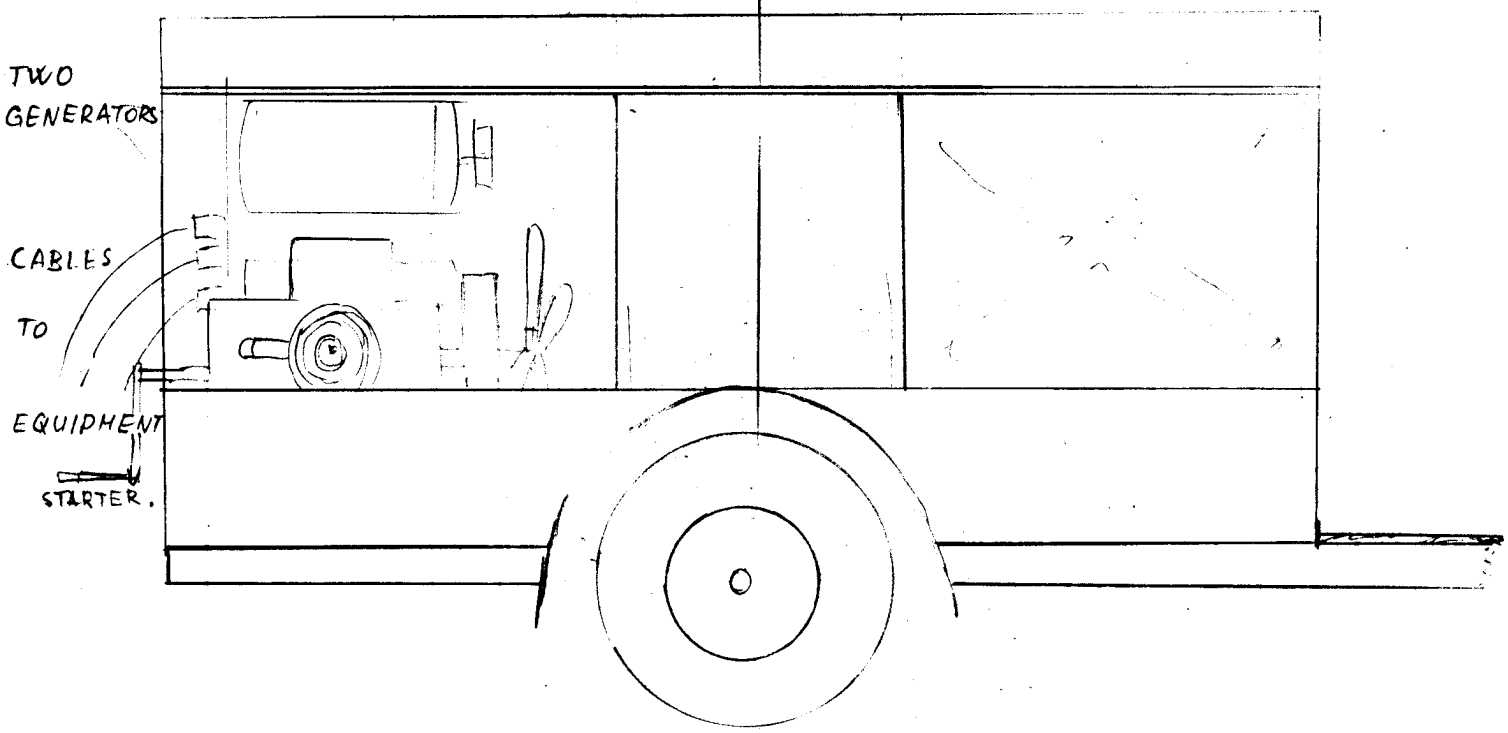
BOTH SIDE IS EQUAL (WORKING - RESERVE)



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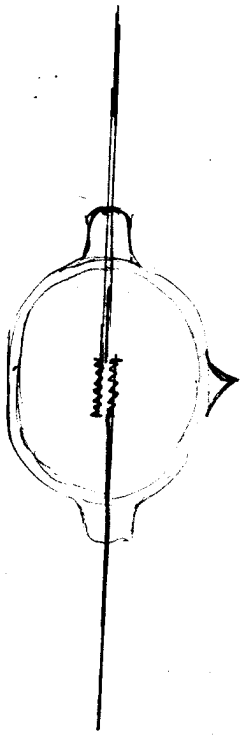

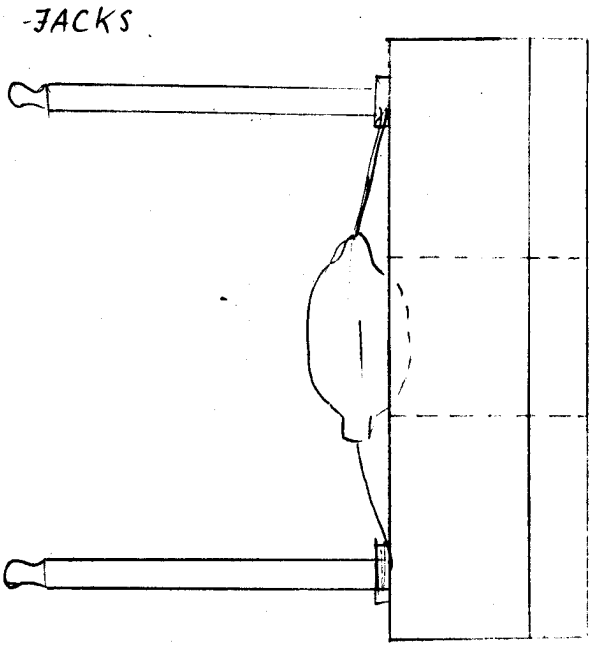

103 TR-SW. TUBE